AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.

JULIUS F. SACHSE, Editor. XANTHUS SMITH, Associate Editor.

VOL. XIV. DECEMBER, 1893. No. 168.

CIVIL AND MILITARY PHOTOGRAMMETRY.*

BY R. MEADE BACHE.

U. S. COAST AND GEODETIC SURVEY.

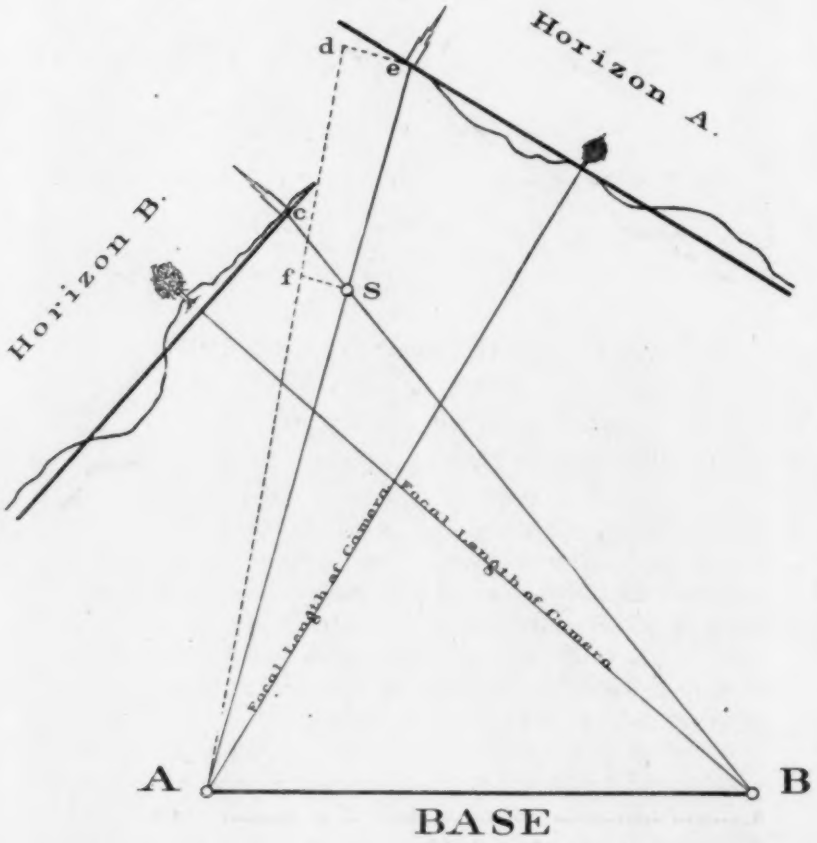
PHOTOGRAMMETRY is recognized as a legitimate mode of surveying. It is, in fact, if practiced with due regard to the limitations involved through spherical aberration from object-glasses of too wide aperture, a mode of surveying of considerable accuracy, although not for a moment to be compared to other perfected modes of the present day. It can never rival these in their sphere, which is the sphere of extreme precision, but at the same time it must be admitted that, within its own, it is capable of doing good service.

The diagram on the blackboard has been made as simple as possible, to illustrate the mode of obtaining a single vertical and a single horizontal determination. It is evident, however, that the sectors of horizon and intervening landscape belonging to each picture, assumed to have been taken from the respective stations, *A* and *B*, might be filled with objects. Many of these, from the fact of their having been visible from both stations, would be determinable by this method of cartography.

AB is a base to serve for the determination of some of the details of a survey. The optical axis of the camera being set at

* Read before the American Philosophical Society.

each station respectively upon a prominent, distant object, say a lone tree, the angle at each station between the base and that object is taken. The rays of light *eA* and *cB*, respectively, pro-



ceed from a steeple to the photographic points of view *A* and *B*. The intersection of these rays at *S* gives, according to the scale of the plotted base, the horizontal position by scale of the steeple with reference to those points of view.

In deference to a misunderstanding of which I heard lately, as to the relations of the horizons to each other, as represented in

this diagram, I shall endeavor to preclude it now by calling attention to the fact that the horizons are here laid down as to direction, but in order to secure the utmost simplicity in the diagram, not as to their possibility of lateral extension. Objects, for instance, in the middle distance of the steeple, as seen in elevation on horizon *A*, from station *A*, would, at station *B*, fall to the left of the steeple, as seen in elevation on horizon *B*. Conversely, objects in the general direction, and in the background of the steeple, as seen in the elevation on horizon *A*, from station *A*, would fall to the right of the steeple, as seen in elevation on horizon *B*, from station *B*.

The chief method of photogrammetry in use at the present time is illustrated by this diagram, and is based on very simple principles. The angles and distances obtained in ordinary surveying are merely natural or artificial selections. They are merely arbitrary subdivisions of space, convenient selections from an infinite number of similar elements. But it is also true that, the relations of a few of those elements being judiciously selected and determined, all others secondarily deduced fall into harmony with them. The photographic camera, however, as compared with other surveying instruments, does not lend itself at first to selection, but giving all visible nature from various points of view, enables the employer of it finally to make his selection from the resulting pictures, as if from nature itself.

From all points of view, then, angles and distances exist in nature, and although they apparently change, as the observer changes place, the correspondences among them, as seen from all points of view, are perfect. Hence, if we delegate to the photographic camera the duty of making a permanent record of nature, as seen from two or more points of view, the intersection of the rays of light, reaching those points of view respectively from the same objects, as pictured in photographs properly placed, will, by their intersection on paper to become a map, give the positions of those objects relatively, as plotted, to the points of view and to one another.

Occupying with a photographic camera the points formed by the termini of a base line on the surface of the earth, having on its

photographic plate imaginary vertical and horizontal lines, susceptible of being developed into real ones, the intersection of these lines corresponding with the center of the perspective picture (the former enabling the operator to set the camera accurately to any horizontal direction, the latter giving, when the camera is leveled, the horizon for each picture), the camera is fixed in turn at the two stations upon some distant determinate object by its line of sight, its position being otherwise so adjusted that the objects to be determined in the landscape, within a given sector of the horizon, shall appear on the picture as taken from each of the two stations. The azimuth of the base line, and of the lines of sight from it being determined by the theodolite, field transit, or compass, the survey for a particular sector of the horizon at the two stations lacks but one factor to make it complete, as soon as the pictures shall have been taken by the camera. The camera has given, by its occupation of the two stations at the ends of the base line of assumed length, only one portion of the data necessary to constituting a survey, namely, the angles subtended in nature by the various objects which come within the scope of both resulting pictures. A very simple addition, however, suffices to make the survey complete. To secure that, to introduce the element of scale, it is necessary to know the length of the base line. The scale to which the base line is plotted on paper becomes, then, through the acquisition of knowledge of the length of the base on the ground, the scale of the whole resultant map; which, it should be incidentally noted, must range by scale no further from each station than to a distance where rays of light to the two stations give good graphical intersection, the extent of the range by scale being conditioned upon the length of the rays by scale relatively to the length of the base line by scale.

Not only do rays proceeding from the same object, as introduced on two pictures properly placed, give by their intersection the horizontal position by scale of the object with reference to the base, but the angle subtended on any pictorial horizon by two objects, as seen from the properly plotted point of view of that horizon, represents on a map the actual visual angle as seen from that point of view in nature. In fact, the latter truth is that which

is in nature the fundamental one in this connection. It is axiomatic that the visual angles in nature between all objects whatsoever, as projected on a given sector of the horizon, as seen by the eye of the observer, or that of the camera, from a given point of view, are the true angles between those objects, and that their sides, converged at the point of view, represent the true directions of the rays from those objects, corresponding with a base in nature with reference to which their angles are either directly or indirectly, in this case indirectly, known. Therefore it is because, in a *single* picture, the angles between different objects, in fact between all objects there, at the distance of the focal length of the camera, as seen in the picture from its plotted point ef view, are the same as in nature from its point of view, that the intersection of rays from the same object, as seen on *different* pictures, placed in position corresponding with the way in which the landscape was photographed from nature, must represent by scale the horizontal position of the object as it stands in nature. That is to say, if what we see from one point of view in nature is true by angle, and also by angle true, although different, as seen from another point of view in nature, then the intersection of the individual rays, by means of which we have seen the objects in their angular positions with reference to each other, must represent their true horizontal positions with reference to the base which we have traversed between our respective points of view. And if this holds good with respect to nature, it must hold good with respect to corresponding pictures of nature, placed horizontally with relation to each other as nature had presented itself from those individual points of view from which the pictures were taken. The result, expressed as a surveyor would state the case, depends upon the fact that, if a point lies somewhere on a line, and also somewhere on a line intersecting the other, then the point will be at the intersection of the two lines. In this case the two lines are simply the visual rays, shown in the respective pictures, in the positions and with the angular effects as seen in nature, intersecting each other on their passage to the respective points of view.

In practice, a round of pictures, each taking in a certain sector of the horizon and intervening landscape, and slightly over-

lapping one another, is made to cover the tract of which it is contemplated to execute a survey, and the area comprised by them is pictorially duplicated from one or more stations. It is always desirable that the same objects shall be seen, if good intersection of rays can be secured from the different pictures, from three stations instead of two, because an error in one of the azimuths at the end of a single base, which of course gives only two lines for an intersection of rays, would vitiate a whole survey, whereas, with two bases, involving three points of view, and the intersection of three rays, accuracy throughout a survey receives a crucial test. The adoption of this plan, which is like that employed in ordinary triangulation, is also desirable on account of its securing accuracy of plotted results; because graphical differences in the positions, as given by the intersection of only two lines, are virtually eliminated by obtaining for intersections the mean positions as derived from three lines.

The survey, so far as the instrumental part of it is concerned, being complete, it only remains that the plotting of it shall be done. The base line being laid down to scale on paper, lines are drawn from its termini, at the angles with it represented by the azimuths of the lines of sight as determined there on the ground. On this representation on paper of the lines of sight, at the respective plotted stations, are placed, at right angles, printed on thin paper, the photographs taken at the two stations, in such manner that the individual plotted line of sight shall point on the photograph upon the representation of the object upon which the real line of sight was directed in nature, after that representation shall have been vertically projected on the horizon line of the photograph, and that the horizon line of the photograph shall be distant from the individual plotted station by the focal length of the particular camera that was used in taking the pictures. The eye then, placed in position over a plotted station, and looking at a photograph corresponding to the view taken from that station, sees, as already demonstrated, that view under precisely the same angular effect as the view is presented by nature on the ground. Consequently, as angles formed by rays of light with the base line are given truly in nature, are also given truly by the camera,

and are now given truly as plotted on paper to become a map, the intersection on that paper of these rays, as proceeding from the pictorial representatiou of the objects from which they are derived in nature, after their pictorial source has been vertically projected on the horizon line of the photographs, will be the positions of the objects on the map, with due relation by scale and angles to the stations of the base line and to one another. The contemplated map will, in a word, be susceptible of being drawn throughout to scale. It is clear that a large number of objects may be thus plotted from two stations representing the ends of a base line, and that if we know the length and azimuth of a base line, and the azimuths of the lines of sight from its termini, the elements of scale and orientation will inhere in all the resulting work that goes to form a map. Used for the function described, the photographic camera is therefore very aptly called the camera-theodolite.

Adopting the same diagram to illustrate the mode of determining height by the camera-theodolite, we see the steeple, as observed upon from the point of view A, having the ray eA coming from the photographic position of the steeple as projected on the horizon line of the photograph taken from A. Draw from the point e the height of the steeple, as derived from the photograph taken from A, perpendicularly to the ray eA, and draw also the hypothenuse Ad. Any one intuitively perceives that the pictorial height of the steeple being ed at e, at the end of the focal length of the camera, its height at S, the horizontal position by scale of the steeple, must be Sf, and that that by scale is the true height. The length of the line Sf may therefore be obtained numerically by applying to it the scale of the base, which may be the scale of a whole map. With a greater degree of precision the same result may be reached by computation, because $Sf = AS\frac{ed}{Ae}$; $\frac{ed}{Ae}$ being the tangent of the vertical angle $d\,A\,e$, and AS the distance from the point of view A to the steeple S.

Of course the height of any natural as well as of any artificial object above the plane of the horizon may be ascertained by similar means. A steeple was chosen to illustrate both horizontal

and vertical methods of determination, because it affords points that are so conspicuous as compared with those of many other objects that offer themselves to the sight in most surveys.

Surveys from this kind of photogrammetry may be plotted to any scale, within reasonable limits of size, by adopting for the base line of the survey the scale desired. In all cases, however, the photographic pictures must, in order to enable them to present correct angles for the map, be placed in the manner already prescribed, on the respective horizons as plotted on the paper to become a map.

Eighteen Great Financial Crises.—

1763, at Amsterdam, originating with the house of de Neufville, involving 77 failures.

1773, in Holland, liabilities aggregating over $50,000,000.

1799, in Hamburg, 82 failures involving $10,000,000.

1799, panic in Liverpool.

1814, in England, 240 banks suspended.

1825, in Manchester, liabilities $10,000,000.

1831, in Calcutta, involving $75,000,000.

1837, failures of State banks from wild cat prices.

1839, the bank of England was saved by the bank of France.

1839, a panic in France; 93 companies failed for $30,000,000.

1844, crisis in England and reformation of the Bank of England.

1847, English failures involving $100,000,000.

1857, in the U. S., 7,200 failures for $560,000,000.

1866, Overend, Guerney & Co., failure, involving failures, over $500,000,000.

1869, Sep. 24, Black Friday in Wall street.

1873, general panic in United States.

1883, shoe and leather trade crisis in Boston, losses of over $10,000,000.

1884, the Grant & Ward failure, N. Y. City, involving many other firms and a loss of over $25,000,000.

Leather Studio chairs may be revived by rubbing with the white of an egg.

A CRITICAL DESCRIPTION OF THE LUMIERE-LIPPMANN RESULTS.*

FREDERIC E. IVES.

IN the spring of 1882 there was exhibited in the Photographic Exhibition in the Champs de Mars, in Paris, photographs by the Lippmann process of a parrot, a branch of holly, pieces of colored glass, etc., which Alphonse Berget and others declared were true reproductions of the colors of the objects. I could see in these photographs only the colors of thin films, metallic and changeable as such colors usually are, and in some instances not even confined to the colored objects themselves, but spreading over objects that were uncolored in the original. These pictures were also devoid of either whites or blacks, the high lights of the objects being rendered more like black than the shadows. Others, notably Mr. Cameron Swan, who wrote a letter on the subject to the *Times*, noticed the same defects in these photographs, and Captain Abney, who had experimented with the process, found that by varying the time of exposure he was able to make a blue photograph with red light, and *vice versa*, and colored photograph with white light. It was generally admitted that the results by Professor Lippmann did not sustain the claim made for the process, and when it was announced this year that the brothers Lumière had succeeded in so far improving Lippmann's method as to obtain really satisfactory color photographs of natural landscapes, people who had seen the photographs for which such extravagant and inaccurate claims were made a year before were naturally, and very justly, skeptical.

Now, however, the Lumière photographs have been shown in London, and, although there is still a certain amount of mystery surrounding them, it is possible to form a truer estimate of their character and importance, and to make an intelligent comparison with another and more successful method, based upon quite different scientific principles.

* Read at the meeting of the Photographic Society of Philadelphia.

THE NEW SPECIMENS DESCRIBED.—The Lumière photographs are about three inches square, and by light reflected from their surface at most angles they have much the same appearance as the French albumen process lantern positives, the high lights of the picture looking like clear glass, and the shadows having the appearance of an albumen or gelatine film filled up with a dense dark-colored deposit of silver. It is said that by transparency they are negative images, but those shown are sealed up so that they cannot be examined by transmitted light.

Unlike Lippmann's photographs, these examples show color only when the light is reflected from the surface at one particular angle, and for that reason the colors are not "changeable." This in itself is really a very important improvement, although it carries us farther away from instead of nearer to the popularly desired conditions in color photography. It is, indeed, a significant fact that real and undoubted improvement intensifies instead of lessening a characteristic defect of the original Lippmann photographs, which some writers have not hesitated to say would "undoubtedly" be overcome—namely, the inability to see the colors at all angles.

If the pictures were uncovered the critical angle would undoubtedly be perpendicular to the surface of the plate, but it would then be necessary to provide some means for illumination and vision in precisely the same direction. It is also necessary that the source of light be large enough to illuminate the entire surface of the photograph equally with parallel rays, and it should be seen by parallel rays coming from it. A rough approximation to these conditions is secured by covering the picture with a shallow prism, and examining it by the reflected light of a sufficient expanse of even white or gray sky, holding the picture at nearly arm's length from the eye. More satisfactory results could doubtless be obtained by means of a special device, which could be used like the stereoscope or the photochromoscope. It would be quite easy in this way to exactly fulfil the theoretical requirements for illumination and vision, and at the same time to magnify the picture, which must now be made to occupy only a very small angle of vision in order to be seen all at once.

The pictures are also projected upon a screen by means of the megascope or aphengescope lantern, and in the absence of a special device for examining them by daylight this is the only really satisfactory way of seeing them. It is, however, necessary to employ a powerful electric arc light in order to project them with satisfactory brilliancy up to even 2 feet diameter, as compared with 10 feet, or 25 times greater area, for the photochromoscope pictures with the same light.

THE SEVEN PICTURES SHOWN.—Seven pictures were shown at the Photographic Congress and at the Camera Club, four landscapes, two portraits, with accessories, and one reproduction of a chromo-lithograph, a rather poor result, the original of which was not shown. Unlike Lippman's photographs, they rendered the deepest shadows black and the high lights white, and showed many delicate shades of color which impressed the spectators as being something more than ordinary colors of thin films. One of the landscapes was beautiful, although the foliage appeared to be that of autumn, while it was understood that the photograph had been made in early summer. In parts of some, the chlorophyl green was fairly well represented, but in others, where autumn foliage was not suggested, the green was raw and metallic. The red of a tile roof looked dull and faded, the blues of the skies were criticised by some of the spectators, and the flesh in the portraits had an unnatural purplish hue; but, in my opinion, these defects are only such as one ought to expect from the manner in which the process was carried out, even assuming that it be really capable of making accurate color reproductions if carried out in a thoroughly rational manner. From a theoretical point of view (and, it follows, from a practical point of view), it is not reasonable to expect that a mixed color like chlorophyl green will be accurately reproduced on a plate not sensitive into the red of the spectrum below the first absorption band of chlorophyl, or which is disproportionately sensitive to that red as compared to the sensitiveness to green. In the first place, the green rays only would act in producing the picture, resulting in a raw, metalic color, and in the other case the red rays would act too much or the green too little, and result is a brown or red hue, sugges-

tive of autumn tints. Flesh color, if the plate is disproportionately sensitive to blue, and not sufficiently corrected by yellow screen, must take on a purplish hue; or if over-corrected by yellow screen, a yellow hue must result. It follows that the plates must not only be sensitive to all colors, but the sensitiveness must be properly distributed along the spectrum, or, what amounts to the same thing, must be modified by the use of a quantitatively selective color screen, made up and adjusted by experiment in photographing the spectrum itself, just as I have for years made selective color screens for carrying out the photochromoscope process, and for orthochromatic photography, until the spectrum photographs correspond to the spectrum itself in the relative visual intensity of the different colors. Until this is done, it is not reasonable to expect that delicate shades of compound colors will be accurately reproduced by any process. It would appear from this that by no evident possibility can this method ever possess any advantage over the photochromoscope process in the matter of accuracy, because in both cases it depends (admitting every possibility for the Lumière-Lippmann process) upon the relation of sensitive plates and color screens, which must be regulated in the same way for both processes.

The Rendering of Blacks and Whites.—One of the most remarkable things about this Lumière process is its rendering of blacks and whites. According to Lippmann's theory, the blacks would be rendered by clean glass, and the whites by a film filled up with laminæ of deposits which would reflect light of every wave-length. In short, the greatest amount of deposit and opacity would be in the whites and the smallest amount in the blacks of the picture, as in an ordinary photographic negative. I have already observed that the Lumière photographs, when seen by ordinary reflection, resemble a positive instead of a negative. It is further remarkable that the greatest amount of light reflected from these photographs comes from the parts which look like clear glass, and that even this amount, which makes the whites of the picture, is only equal to the reflection from a black glass, or the surface of the gelatine film itself. The shadows appear black, not because there is no deposit there (in which case the deepest

shadows of the picture would be as "white" as the high lights in the examples shown) but because the glass is obscured by a deposit so thick and matt that it scatters the light striking upon it, instead of reflecting it straight back at the critical angle. In other words, we appear to have a positive where we are told that there is a negative; if this be true, is the positive the result of a "reversal" of the image by the long exposure, and, if so, is the reversal one of the conditions of success?

Does not this image, built up by photographic action upon the sensitive plate, act by a process of subtraction from the white light, which would otherwise be reflected from all parts of its surface alike, instead of by reflection from internal laminæ in the manner assumed by Lippmann?

Lippmann's theory, as I understand it, calls for a different series of laminæ within the film for every wave length of light, amounting, where white light acts, to over 30,000 laminæ in a film no thicker than a single wave length of red light! Would not such a series of laminæ in a film reflect a great deal of light instead of adding nothing whatever to the normal reflection from its surface, which is all we appear to have in the examples shown? Cannot every color actually shown in the Lumière photographs be reproduced by means of a single interference film of varying thickness, backed up or broken by a granular deposit of varying density? Have we anything more than this in the Lumière photographs?

It seems reasonable to suppose that the long exposure given to these pictures would produce a reversal of the image. The dense deposit in the shadows might result from the action of scattered light in the camera, or to preliminary exposure, or to the use of a too active developer, or to any or all of these causes combined. May we not be given an opportunity to learn the truth, in order either to prove Lippmann's theory, or to formulate a new and more rational one?

At first glance it might appear that an examination of the Lumière photographs by transmitted light might yield an answer to all of my questions by showing that the image is really a negative one; but it is not even necessary, in order to explain the

"whites" of these pictures, to assume that the image is positive throughout, but only that there is a superficial reversal, just sufficient to prevent the production, in development, of a deposit superficial enough to obscure the normal surface reflection of the gelatine film.

I have some hesitation in putting forth views which a more thorough examination of the Lumière photographs might lead me to modify; but, since such examination is forbidden, I can only hope that the questions which I raise may help to bring about such a thorough investigation of the subject as its importance demands.

In conclusion, it is worthy of note that the Lumière-Lippmann process, whatever its capabilities as to accuracy may prove to be, when it is carried out according to theoretical requirements, is necessarily subject to limitations similar to, and in some respects greater than, the already successful photochromoscope process, which is carried out with commercial sensitive plates and ordinary development. Knowledge of this fact, which cannot be gainsaid, will doubtless lead many people to take an active interest in the friendly rivalry which promises to attend the further development and application of the two methods.

New Art Gallery.—The handsome new four-story building of John D. Strunk, 730 Penn street, Reading, especially erected for the purpose of the production of pictures by the action of light on chemicals, is one of the most complete buildings of the kind in Pennsylvania. The old building has been torn down, and on the site has been erected this complete new building. The apparatus and the fittings used in the production of photographs are of the latest inventions, the backgrounds and accessories, especially, being of entirely new designs, purchased after having inspected the photographic art department at the World's Fair. Mr. Strunk employes twenty hands, all having an extended experience in their various departments.

All the Egyptian paintings were executed according to a code of rules laid down by the priesthood.

DIFFUSED DEFINITION: METHODS OF OBTAINING IT.

SOME persons are apparently inclined to consider pictures of the "fuzzy" order quite a modern idea. Such, however, is not the fact, for over forty years ago, in the very earliest days of the art, the excessive sharpness given by the lens was objected to by some, and different ways of destroying it were suggested. That advocated by the late Sir William Newton has been utilized by modern "fuzzyists," namely, the interposition of tissue paper, or other translucent media, between the negative and paper while printing. Later on, Mrs. Julia Cameron produced her extremely unsharp pictures by employing lenses possessing a large amount of spherical aberration, such as a single lens with an abnormally large aperture. The object of the present article is not to touch upon the question of the desirability, or otherwise, of diffused difinition, but rather to point out some of the ways by which it can be, and at different times has been, obtained.

It may here be explained that diffused definition produced by one system may be widely different from that obtained by another. For example, the diffusion of a picture caused by putting the lens out of focus, after focusing, is very different in character from that produced by using a lens possessing a certain degree of spherical aberration worked at its sharpest focus, as with a single lens with large aperture, or the lens of Mr. Dallmeyer, in which spherical aberration can be introduced at will. Unsharp pictures result in either case, but the effect is quite different. The late Mr. Claudet introduced a very ingenious way of destroying the excessive sharpness in any one plane, or, as it was termed, diffusing the focus. His method was to alter the focus of the lens during the exposure. This he did, not by racking the tube in or out, but by causing the glasses themselves to approach towards, or recede from, each other, thus altering the equivalent focus while the negative was being exposed. The pictures produced in this way were very pleasing, and, although they were not really sharp, they did not appear to be blurred, or at all pertaining to the pictures of the present fuzzy school.

Many years ago a novel method was suggested for destroying excessive sharpness. It was this: A cord was tied to the camera and fastened tightly to the floor. Then, after a portion of the exposure had been made, a violin bow was lightly drawn across the string so as to produce a slight tremor in the camera. The blurring produced in this was distinct from that obtained by other means. Another plan was, during the exposure, or during part of it, to place the lighted spirit lamp some distance below the lens. This caused rarefaction of the air, and thus produced motion of the atmosphere similar to the heat haze so frequently seen near the ground on a hot summer day. This has a marked influence on the sharpness of a negative.

We have seen some very good effects produced by using a lens of the old doublet form in the following manner: The fixed stop had been removed and larger Waterhouse stops substituted. The exposure was commenced with a stop sufficiently small to give sharp definition. Then, when the negative was, say, half exposed, the stop was removed, and the exposure completed with the full aperture, which, of course, gave an unsharp image on account of the spherical aberration. Thus was obtained a somewhat sharp image as well as a confused one. Here, again, we had diffused definition of a different kind from that obtained by the other methods indicated. This system is also sometimes utilized in enlarging from small negatives in which the retouching is painfully conspicuous, or the face badly freckled. The exposure is commenced with a stop in the lens, and completed with the full aperture of the instrument. The character of the image thus obtained is quite different from that where the lens is put out of focus. Sometimes the lens is moved slightly in or out of the sharpest focus during the exposure, but the fuzziness produced by this method differs from that by the others. All the above methods of diffusing definition were chiefly utilised for ameliorating the excessive sharpness in large portraits, but it is obvious to every one that they can be equally as well applied to every other class of picture.

Reference was made at the commencement of the article to destroying the sharpness of a picture by printing through a trans-

A GLEAM OF SUNLIGHT.

NEGATIVE BY GEORGE E. EBSIG

lucent medium. That is often resorted to, but not always, perhaps, to the best advantage. Our older readers will remember a then new style of portrait that was shown in this country some quarter of a century or so ago—the invention of Denier, of Russia. The pictures appeared to be both sharp and unsharp at the same time, and were not at all unpleasing even to those who look upon excessive sharpness as an essential to a good photograph. The method by which they were produced was offered for sale as a secret process, and was never published authoritatively, though there was much speculation at the time as to what it was. It was said to contain two thin negatives—identical—and printing from them with one superimposed upon the other. Be that as it may, we and others produced similar, indeed, identical and equally good, results in the following manner. The negative, a perfectly sharp one—indeed, an every-day negative—was taken and placed in the printing frame with a piece of sensitive paper upon it and exposed to light. When the print was about half, or a little more, done, a sheet of thin glass, or, in the case of small pictures, two or three thicknesses of sheet gelatine, was interposed between the paper and the negative and the printing completed. By varying the depth of the contact printing and the thickness of the afterwards-interposed medium, the effects could be considerably modified. It is a little surprising, considering the outcry that is sometimes made with reference to the excessive sharpness in large portraits, that this method of ameliorating it is almost, if not entirely, neglected; for, although the pictures thus obtained are not actually sharp, they can scarcely be classed as unsharp, unless the contact printing is too brief, yet they are quite distinct from the class of pictures termed "fuzzitypes." The effect can be further varied by making what may be termed the primary printing through the insulating medium, and completing it with the paper in contact.—*British Journal of Photography.*

Borax water will remove stains from the hands.

The finest existing ancient picture is a mosaic, the "Battle of Issus," found in a pavement at Pompeii.

RAPID PRINTING ON ORDINARY ALBUMENISED PAPER.

PERHAPS the most considerable reproach against the old method of photographic printing upon albumenised paper is the long exposure required in comparison with development methods, and this long exposure tells most hardly against the professional photographer in the dark months upon which we are just entering.

In spite of all its disadvantages, it must be remembered that albumenised paper has substantially held its own for the half a century which has elapsed since it ousted the printing by development, as introduced by Mr. Fox Talbot; but during the last few years the introduction of high-gloss gelatine papers, and that pressure of the times which forces business people to supply goods promptly and irrespectively of weather or other contingencies, have tended to materially lessen the use of albumenised paper. But now that Herr Valenta has introduced satisfactory methods of developing albumenised paper so that the same material may be used for printing out in bright weather, or for treatment by development in dull weather, or of an evening, we may, perhaps, expect a return to the partly discarded albumen.

When albumenised paper is developed according to Valenta's method the exposure is reduced to one-fourth or one-fifth, so that printing by gas light, or by the light of a paraffin lamp, becomes practicable, and enlargements may be made direct from the negative by means of the electric arc light; or even limelight or paraffin.

The print, or removal from the frame, is washed just as usual, and when thus freed from any unaltered nitrate of silver, it is developed in the following bath:—

SOLUTION A.

Hydroquinone	10 grammes
Alcohol	100 "

SOLUTION B.

Sulphite of soda . . .	100 grammes
Citric acid	5 "
Water	500 "

For use, five cubic centimeters of A, five cubic centimeters of B, and 100 cubic centimeters of water. While in this bath the faint violet image becomes of a deep yellowish brown, and details appear in the lights; ten minutes being about the time ordinarily required for development.

The development being completed, the prints are washed and toned; a sulphocyanate combined toning and fixing bath being used by preference. That recommented by Messrs. Lumière Brothers for their citrate paper answers well, namely:—

Water	500 cubic centimeters
Hyposulphite of soda . .	200 grammes
Sulphocyanate of ammoniun .	25 "
Alum	30 "
Ten per cent. solution of acetate of lead . . .	40 cubic centimeters

This bath should be heated to 60° Centigrade, and filtered, after which 50 cubic centimeters of the following is added:—

Water	60 cubic centimeters
Chloride of gold . . .	1 gramme

Ten minutes in this bath is usually sufficient, although the time must be varied so as to obtain the required tone; and all that now remains is to wash and dry the prints.—*Photographic Work.*

The Bird on a Vacation.—It is a relief to learn that the famous bird which was so long expected to fly from the photographic cameras is no longer an object of curiosity. For generations the children have been watching for him, but up to date no child has ever had the satisfaction of seeing the little feathered myth appear. Inquiry of a West Chester artist lately elicited the information that the bird is not in use among photographers now-a-days, for he has gone on an indefinite vacation, and other means are used to keep the children quiet while their pictures are being taken.

PHOTOGRAPHS IN NATURAL COLORS.*

Produced by the Improved Process of L. Lumière, after Proeessor Lippmann's Interference Method.

LEON WARNERKE.

THANKS to the great kindness of M. L. Lumière of Lyons, we are able to examine to-night the latest results obtained by him. A few explanatory remarks are necessary to make the method of their production generally intelligible. About two years ago Professor Lippmann, of the Sorbonne in Paris, succeeded in producing photographically a colored image of the solar spectrum, based on the well known principles of interference. He used for that purpose a plate coated with an albumen, collodion, or gelatine sensitive film. This sensitive film was during exposure brought into contact with metallic mercury, the image of the spectrum being projected on the film, through its glass support. The light, after penetrating through the thickness of the film, was reflected back from the surface of the mercury, the direct light waves encountering the waves of reflected light, producing the phenomenon of interference in the thickness of the film. The waves of light propagating in opposite directions, cause the vibrations at certain intervals to be neutralized, while at others they are intensified. If such a plate could be developed, fixed and dissected, we should find it to consist of strata of the black deposit of silver, produced by the developer in the parts corresponding with the maximum of light, succeeded by transparent strata, corresponding to the minimum of light, where the developer had no action. The distance between the strata is equal to half the wave length, which is 600 ten-thousandths of a millimetre for red light, 583 for orange, 551 for yellow, 475 for blue, and 423 for violet. In a film $\frac{1}{20}$ m.m. thickness there will be about 200 such strata. It is evident that on examining such a plate by reflected light we shall observe the colors, because it is formed of a series of films of the thickness requisite to produce color sensations. Subse-

*From Transactions of Photographic Society of Great Britian, October 11th, 1893.

quent experiments proved that by using a gelatine film sensitised with a chromium salt, a similar result is obtained, the action of interference producing strata of soluble and insoluble gelatine.

The exposure of the plates produced by Lippmann was very long, and, owing to the variation of sensitiveness of different rays of the spectrum, necessitated the masking of the portions exposed to the more actinic rays, while the others are exposed. L. Lumière succeeded in producing colored images in one operation, and in last May, in a paper read before the Paris Académie de Science, gave full particulars of the process as follows:

ABSTRACT.

To prepare the emulsion the following solutions are made—

A—Distilled water . .	400 parts
Gelatine	20 "
B—Distilled water . . .	25 "
Potassium bromide . .	2.3 "
C—Distilled water . . .	25 "
Silver nitrate	3 "

One-half of A is added to B and the other half to C. These two solutions are mixed by adding the silver to the bromide. A suitable sensitiser is added, such as cyanine, methyl violet, erythrosine, etc., and after filtration plates are coated on a tourniquet at a temperature of 40° C.

When the emulsion is set the plate is immersed in alcohol for a very short time, and washed in a continuous stream of water. The film being very thin the washing is soon effected. This emulsion should not be washed in bulk, lest coarseness of the particles of silver produced by re-heating results, and in order to have the films as transparent as possible; for the same reason a great excess of bromide is to be avoided. The plates are dried, and just before use are immersed for two minutes in

Water	200 parts
Silver nitrate	1 part
Acetic acid	1 "

This bath helps to produce brilliancy of the image, and to increase the sensitiveness. But the plates cannot then be kept

long, because the sensitive surface soon deteriorates. When the plate is dry, it is ready for exposure *a la* Lippmann, viz., with a reflecting surface of mercury next to the film.

For the developer the following solutions are made—

I—Water .	100 parts		
Pyrogallic acid .	1 part	Sol. I . .	10 parts
II—Water . .	100 parts	Sol. II .	15 "
Potassium bromide	10 "	Sol. III .	5 "
III—Ammonia D. 0·960 diluted to 18°.		Water .	70 "

The degree of concentration of the ammonia has a great influence on the result, even a slight alteration destroying the brilliancy of the colors. For fixing, the plate after washing is immersed for from 10 to 15 seconds in a 5 per cent. solution of potassium cyanide, washed and dried.

In order to lessen the action of the ultra-violet, violet, and blue rays, a parallel-faced bath of Victoria yellow, uranin or primuline is used in the camera.

The pictures lent by M. Lumière are 6 by 8 c.m. in size, and when seen at a certain angle show colors of unsurpassed beauty —beyond anything we are accustomed to see in the way of the reproduction of colors—somewhat metallic in appearance, but very bright and of very decided and definite color.

To examine them direct, the best plan is to use the reflected light of a bright sky, or if a lamp must be used it is preferable to have the light reflected from a white shade or opal globe.

To appreciate all the beauty of these photographs, the image should be lit by a powerful light (preferably electric) and a projection made on a screen by means of a portrait lens (4 in. diameter). The result is then of such beauty as to defy description—it is not like an oil painting or a water color; it is like real nature on a bright summer's day. Seeing these first photographs in natural colors we feel we are in the presence of one of the greatest inventions of the nineteenth century, and we may sincerely congratulate our friends on the other side of the Channel upon so splendid an achievement.

AN IMPORTANT DECISION.

THE photographic trade will be interested in the following decision, which has just been rendered by the United States General Appraisers of the Treasury Department, in the matter of the protest of the Blair Camera Company, against the decision of the Collector of Customs at Burlington, Vt., as to the rate and amount of duties chargeable on certain photographic films made of collodion, imported by express, by the Blair Company nearly a year ago. The opinion is in the language of General Appraiser Ham, and is as follows:

The merchandise in this case consists of cut films or photographic films made of collodion, assessed for duty at 60 cents a pound and 25 per cent. ad valorem under paragraph 21, but claimed to be entitled to free entry as articles the produce, growth, or manufacture of the United States under paragraph 493.

The case was set for hearing May 9th, 1893, but although duly notified appellants failed to appear and offer proofs in support of the contentions of their protest. It must, therefore, be considered on the record.

Questions as to the sufficiency of the protest in form are raised by the collector whose action is complained of, namely: (1) That it was not filed in duplicate, as required by article 930 of the Customs Regulations of 1892, and (2) that it was filed in the name of appellants by one Henry W. Belknap, in contravention of the requirements of section 14 of the act of June 10th, 1890, which provides that protest shall be made by the owner, importer, consignee, or agent of the merchandise in controversy, it not appearing at the time of filing of said protest that said Belknap was authorized to act. This objection, however, is obviated, since it appears from the record that said Belknap was in fact the agent of appellants at the time of the filing of said protest, and therefore had authority to act in the premises in their behalf.

As to the other (first) question, it may be remarked that the statute, section 14 of the act of June 10th, 1890, does not in terms require the filing of the protest in duplicate, and hence, without

deciding whether the letter of the regulation expressed in said article 930 would be conclusive against appellants in case of the refusal of the collectors to accept the protest, it is sufficient to say that his consent to accept it operates as a waiver of his technical rights thereunder.

There are other objections to the protests, but a careful examination shows its claims to be in substance: (1) That the articles subject of it are of American manufacture; (2) that they were exported to Japan; and (3) that they are returned to this country, and hence entitled to free entry under paragraph 493, on the ground that they have not been advanced in value or improved in condition by any process of manufacture or other means. The protest states, among other things, that said articles, consisting of sensitive photographic celluloid plates

Were taken to Japan, exposed in a photographic camera, and returned to appellants to be developed, by the application of proper chemicals, into photographic negatives, from which lantern slides are to be made.

Said protest further states that

Without the application of the proper chemicals said plates are of no value; and except that they have been exposed to the light passed through a lens they are in the same condition as exported.

In a letter to J. W. Baldwin, agent of the American Express Company, dated December 10th, 1892, appellants state that the articles under consideration are:

Celluloid films, manufactured by us in Pawtucket, R. I., and used for photographic plates, having been sold by us within a few months and exposed by Messrs. Burditt and North (the consignors) in and on the route to Japan. They are returned to us to be developed into photographic negatives, and in their present condition are of no value.

Appellants are bound by their own statements of fact which appear in the record, and these foregoing statements conclusively show that said sensitive plates were sent abroad for a distinct purpose, namely, to be "exposed;" that is to say, to receive upon their sensitive surfaces certain impressions, and that upon the return of the said plates to the United States the im-

pressions so received in Japan were to be developed by the proper chemicals into photographic negatives.

It is evident that the impression received in Japan by said plates is of vital importance, and that it not only changes their character, but increases their value, and that they are thereby advanced in value or improved in condition by a process of manufacture or by other means, thus withdrawing them from the operation of paragraph 493 of the act of October 1st, 1890, and apparently relegating them to paragraph 21, as partly finished articles of celluloid.

On the evidence we find as facts:

(1). That the articles in question were imported under the act of October 1st, 1890; (2) that they are articles of American manufacture, exported; but (3) that they were advanced in value or improved in condition by a certain process of manufacture, or other means while abroad; but (4) that they are partly finished articles of celluloid.

We therefore hold that the action of the collector was justified by law and the facts. The protest is overruled, and the decision of the collector is affirmed.

Remedy for Color Blindness.—According to the *Medical Record*, Dr. A. E. Wright states it to be a fact that total color blindness is very rare; also, that yellow-blue color blindness is very rare. The common form is the green-red blindness. It so happens that in the establishment of signals, green and red lights form the most commonly used colors, hence from three to five per cent. of men capable of doing work as pilots or engineers are kept out of such employments, often with results that are almost cruel. Most color-blind men can readily distinguish yellows and blues, and the doctor proposes that the red lights should have a distinctly yellowish tinge and the green lights a distinctly bluish tinge. In this way the difference between signals could be readily made out by almost all the color-blind.

THE DISTINCTNESS OF PHOTOGRAPHS TAKEN WITHOUT OBJECTIVE.*

BY R. COLLSON.

BY a method elsewhere explained,[1] I have found that the image produced by a small circular aperture on the sensitive surface of the photographic plate shows a maximum of distinctness for a given distance, of the object, if the distance of the photographic film to the aperture has a convenient relation to the diameter of this aperature. In other words, to a position of the object corresponds, for every value of the diameter aperture, a certain length of extension of the camera, and *vice versa.* In the following I propose to point out how interesting and important it is to observe this law in the practice of photography without objective.

It has been and is still believed by many, that this method of photographing is incompatible with a sufficient distinctness of the image on account of the appreciable diameter of the aperture, varying according to the law mentioned, between two and nine-tenths of a millimeter in most of the cases met with.

And first: What is distinctness of image? I define it as the greater or less facility of distinguishing this image from the medium surrounding it. To give more certainty to this idea, if we take as object a small, plain, and uniformly illuminated surface standing out against a perfectly uniform background, the small patch forming its image on the film will be so much more clearly defined, as the change in passing from its centre of intensity to the background is sudden and rapid. In the same proportion as this rapidity of change is diminished, the image becomes more and more indistinct, while the haziness increases. It must, therefore, be determined at what value of this variation we obtain what we call a sufficient distinctness of the image.

Now, it is evident that this depends largely on the very nature of the intended use of the image. So, for instance, if we wish

* Read at the Congress of Photographers, held at Chicago, in August, 1893.

[1] See the accompanying paper on Photography without Objective.

to examine closely the details of a microscopical preparation, we shall try to obtain a very high degree of distinctness. For a landscape, on the other hand, it will be preferable to substitute a less degree of distinctness, being more artistical and more resembling the effect produced by the eye in direct vision; for this landscape, as well as for a building, a statue, etc., and, in general, wherever the image is not intended for microscopical examination, two points of the image can be considered as forming only one, if their distance apart is only one-tenth of a millimeter or less, since the eye could not discern them without the aid of a microscope. This is a well-determined limit, which is generally admitted for the definition of a point in a drawing. Using this definition, we may say that a photographic method gives a sufficient distinctness of the image for the purposes in question, if the interval between two objects, which is theoretically one-tenth of a millimeter on the scale of the image, is sufficiently discernible on the plate to allow a distinct separation of the two images. This is what may be called "distinctness to one-tenth of a millimeter."

On examination of a large number of plates it appears that this degree of distinctness may be obtained by photographing without an objective, if the diameter of the aperture is determined by the rule of maximum distinctness, according to the distance of the object and extension of the camera. If the object is placed very near the aperture (for instance, nearer than one meter for an aperture of four-tenths of a millimeter), as it is done in reproducing drawings, we have the least favorable conditions as regards distinctness; if in reducing to one-half we substitute for a drawing with separate lines, as an etching, a painting with dark and continuous colors, the distinctness is more than two-tenths of a millimeter, yet it is still sufficient to convince us of the continuity of the outlines.

This application is very interesting, and permits to transform etchings into half-toned images, presenting a very artistic appearance.

This may be seen from the specimen of this kind of work annexed to the accompanying paper; in this reduction on the scale of one-half the single lines have entirely disappeared.

In proportion, therefore, with the increase of the distance of the object (the aperture varying according to the law), the distinctness also increases and approaches one-tenth of a millimeter.

The secend plate annexed to the accompanying paper, representing the "Esplanade des Invalides," is an example. These are results of experiments, which every one may verify by placing himself in the conditions mentioned above.

Theoretically it is difficult to understand the possibility of obtaining such a distinctness; for a solution we have to look to the modern theory of light, abandoning the ideas in vogue at the time of Porta, the inventor of the camera.

According to these old ideas the image produced in the camera by a luminous point outside of it, is limited by the rays proceeding from that point which are tangential to the circumference of the aperture,—in other words, the image is inside of the cone of rays terminating in the luminous point, and whose basis is formed by the circumference of the aperture. This cone separates the light from the shadow.

According to this conception, as will be seen, the image of a luminous point is always at least equal to the aperture; it equals it if the luminous point is very far; and according to its approach the angle of the cone increases, together with the area of the image. If this was really the case, then, since the aperture has a diameter of several tenths of a millimeter, every point of the object would be represented by a small surface of the diameter of a still larger number of tenths of a millimeter, and the whole of these surfaces, covering each other, would produce an entirely confused and useless image.

But though this conception, because of its simplicity, first occurs to our minds, yet it must be recognized that it is not verified by experience, and that it cannot be maintained in view of the more modern wave theory. This, however, is not the proper place to explain this theory, which may be left to the students of physics. Yet we may at least mention a very peculiar experiment of Fresnel, which may be easily repeated, and which is closely related to our subject.

We place a sheet of white paper vertically, so that it forms a plane, and at the distance of about two meters a vertical and very narrow slit, illuminated by a source of light, placed behind it and as near to the slit as possible; this source radiates a simple light—red light in Fresnel's experiment. Half-way between the paper and the slit we place vertically the straight edge of an opaque screen.

According to the theory of the geometrical shadow, an abrupt separation of light and shadow should appear on the paper at its intersection with the plane determined by the luminous slit and the edge of the screen.

We observe, however, vertical bands, alternately bright and dark, whose intensities differ less and less as we advance toward the illuminated part with which they unite at a short distance from the shadow. The most brilliant band is the first one, counting from the region in the shadow. With the red light used by Fresnel, it is about one millimeter distant from the place which should be the edge of the geometrical shadow.

We now add a second opaque screen, with its edge parallel to that of the first one, varying the width of the opening between them at pleasure.

If now we leave first a relatively large opening of some centimeters, every one of the two edges gives its own bands, which unite with the illuminated centre of the bright region. Diminishing the distance between the two edges, we see the bands begin to cover one another, until we arrive at a moment when only the two outmost bright bands remain, separated only by a dark band. If we continue to diminish the distance of the edges, the two bright bands coincide, forming a single band at the centre of the illuminated region; the intensity diminishes from each side progressively, with ill-defined fringes. Consequently the light grows feebler, and disappears in proportion to the decrease of distance between the two edges.

All these phenomena may also be produced with blue light, which acts most powerfully upon the bromogelatine film; only the fringes would look ragged. If daylight is employed, it would have the same effect in regard to photographing these

fringes as if blue rays were exclusively used, since the bromo-gelatine film is most affected by these radiations. It is well to be understood that we are concerned here with ordinary plates, not impregnated with substances rendering them sensitive to other radiations.

If we now compare the different aspects of the paper which receives the light, we find:

1. That too large an opening gives a large and ill-defined image.

2. That too narrow an opening causes the image to vanish, diminishes its intensity, add makes the change from light to shadow less rapid.

3. The best result must be obtained between the two extremes, and, indeed, the opening which leaves only one brilliant fringe is much more satisfactory to the conditions sought for.

Besides, we might find that this fringe is much narrower than the luminous part which would be obtained by the geometrical shadow. Substituting now a luminous point for the luminous slit, and for the two screens with straight edges a screen perforated with a circular hole, we observe similar phenomena, in which the fringes are circular. It will now be understood that the small circle forming the image of a point may be reduced to very small diameter, giving a maximum distinctness of the image for an aperture of convenient diameter.

The foregoing is said on the supposition that the luminous point, the aperture, and the sensitive surface are separated by the distances indicated in Fresnel's experiment; but the aspect of the fringes varies with the distances. This explains why the distinctness of the image must also vary, and show a maximum for a value of the diameter of aperture, which depends upon the distance of the object and the extension of the camera. Thus we are able to account for the principles involved in photography without objective, and for the existence of a law of maximum distinctness, confirming the harmony of experiments with the wave theory.

The observation of this law permits to obtain a degree of distinctness, sufficient for many purposes, and which enables us to use the remarkable qualities of this method: extreme simplicity, very large field, great depth of focus, and entire absence of deformation.

TIDES.

BY ALEX. H. SMITH.

"THERE is a tide in the affairs of men, which, taken at the flood, leads on to fortune."

We need not refer to Washington, Napoleon, Jackson, Lincoln, Grant, or other great historical figures, who, though not born great, yet achieved greatness by force of circumstances, or, as put in the language of Brutus, by taking the tide at the flood.

Of course it is not always that we can know the state of the tide, and, in fact, are mostly governed by the drift of circumstances, but in looking backward we can see that our lives are shaped by surroundings, and their course changed by slight events, not at the moment recognized as flood-tide in our affairs. Nor is the "fortune" referred to necessarily stocks, bonds, and bank accounts, but may mean simply honorable, respected, or contented positions of many kinds, fully as satisfying as mere wealth—though that seems now to be the common definition of "fortune."

You all know the barefooted country boy, the prototype of Tom Sawyer, who, emancipated from the log school-house, at the age of fourteen, attracted the attention of the storekeeper, was taken on as clerk on a picayunish salary, with ample and expanding self-confidence backed by industry, honesty, and the desire to please, develop ambition, which in a few years wafts him to the city, where he rises step by step to leading and respectable positions, with or without wealth, but in any case looking backward, scarcely able to realize how the changes have come upon him.

You see a simple country girl dissatisfied with her narrow surroundings, wend her way to the city, where, by chance, she becomes a hotel waitress instead of going into a factory; she is efficient, handsome, marries the proprietor, who becomes rich, probably through her help; he retires at an opportune time, leaving her a blooming widow. She shines as a leader of the "four hundred," goes abroad frequently, marries her daughter to

a title regardless of cost—thus, in her view, taking the tide at the flood.

Or an attractive widow, struggling for existence by keeping boarders, one of whom proposes and is accepted, afterwards strikes "pay dirt," becomes a money-king, and enables his wife to maintain palaces in foreign capitals, where she charmingly entertains royalties of high and low degree, and marries her daughter to a prince with a lineage of a thousand years. Did she know the state of the tide, when circumstances were shaping her destiny?

We are the creatures of fate, which is only another name for circumstances, driven by surrounding breezes, through struggling ever so hard to steer our own course. Few, if any, can project a life-line in advance, and follow to a given end. We can at best put earnest work on the things at hand to-day which will usually steer us to-morrow. If we cannot thus change our circumstances, we will learn to be content. Better to dig clams at the ebb, than to wait idle and discontented for the flood, which it may not be given to us to know when or how to take it when it comes.

The slightest veering from the course might have brought the boy to any other destiny; he may be a grizzly granger, earning a hard subsistence raising wheat at half price on a mortgaged farm, or he may have become the town loafer or a tramp. While the girl might have stayed at home, married, and helped to run a little dairy farm, happy and contented, without knowing or caring anything about the fashionable follies of the "four hundred." Or the widow may have struggled along in poverty and obscurity to the end, not even hearing of a fairy prince, much less dreaming of having the real article for a son-in-law. We may well say with Hamlet:

> **"There is a divinity that shapes our ends,**
> **Rough hew them how we will."**

—"*Stone.*"

The Holidays are approaching. Now is the time when the showcase needs extra attention.

"GELATINO-CHLORIDE PAPERS, THEIR ADVANTAGE AND MANIPULATION."

S. H. MORA.

AT the present time, the question, What paper shall I use? is one that is agitating the minds of a large percentage of the photographers throughout the world, especially in Canada and the United States.

The subject is one of great importance to all and requires careful thought and consideration. That the old standby, albumen, is doomed, is apparent to anyone who is in a position to judge. It has held its place longer than any other process in photography; it has outlasted its associate, the wet plate, but now in its turn must step down and out, giving the place to its successor, Aristo.

The Aristo family is a small one, there being only two members. Collodion, the older, has by hard work obtained a good start and is well on the road leading to success, but gelatine, the younger, is a healthy child, a long-winded sprinter, and at his present easy gait will pass under the wire and take first place without any apparent effort.

It would probably be more interesting to you could I take up both kinds of emulsion and dissect them piece by piece, giving the advantages of each. But business courtesy, as well as personal inclination, prevents my calling your attention to the defects in goods manufactured by competitors.

When a photographer has decided to adopt a chloride paper, the first consideration should be, what brand will produce the most uniform and best average prints. We will presume that he has been in business for some time, and has a number of negatives that were made for albumen paper, from which he is constantly receiving orders. In order to retain this duplicate trade he should aim to produce better prints from the negatives than were made on albumen; consequently his decision must be in favor of a paper which allows a greater latitude in the negatives

*Read at the Tenth Annual Convention of the "Photographic Association" of Canada, November 3d, 1893.

and will produce superior prints from negatives that were made for albumen. In fact, the negative which is best suited to a gelatino-chloride paper is one that has been fully timed and developed, so that it has snap enough to make a good albumen print.

The second question to be decided is, what paper will produce the most uniform and even results with the least labor. That this question also would be answered in favor of a gelatine paper, is an undisputed fact, as it does not curl, or crack, and can be printed from unvarnished negatives without any danger of staining the negatives. The results obtained with it are perfectly uniform and even, and are secured with an amount of ease and certainty that proves a delightful surprise to the former user of albumen paper.

The third question that presents itself is, how much waste will there be. The photographer changing from albumen to a gelatine paper will probably be subject to some loss for a time until his printer becomes experienced in manipulating the paper, and is competent to handle it to the best advantage, after which the amount of waste will be reduced to a minimum, as it is possible to obtain 144 good prints from a gross of paper. In making large prints the amount of waste is very small, as the paper lies perfectly flat in the solutions and can be handled to good advantage, and will permit of an amount of rough handling in the final washing that would totally destroy albumen or collodion papers.

In estimating cost, the three previous questions have to be taken into consideration; quality, ease of manipulation, and small amount of waste. The cost of the paper itself is a minor question, as a cheap paper that entails a loss of time or material will be, in the end, the most expensive.

There has been so much said in the last few months about permanency that we should consider this subject for a moment. Some claim that a gelatine emulsion is not as lasting as albumen. This claim has been proved to be a false one. That photographers have failed in producing permanent results with a gelatine paper is a fact, but it is also a fact that there have been as many who have failed to produce permanent results with albumen or

collodion papers. My honest belief is that all of the papers made to-day are permanent in the way in which we understand the word, when properly handled in manipulation. An intelligent photographer can easily answer the question to his own satisfaction by referring back to the negatives which he has made. He will find that there may be some that have turned color, but if they have turned color in spots it would indicate insufficient fixing. If they have turned over the entire surface he will notice a crystallization of hypo, indicating insufficient washing. But he will find a large majority of his negatives are as clear to-day as they were when made, several years ago. The same thing will apply to gelatine paper, as the base, gelatine, is the same, and consequently should not turn any more than the negative; the chemical emulsion is practically the same as a collodion emulsion. There is, therefore, no good reason why one paper should not keep as well as the other. A large number of photographers have tested the permanency of gelatine emulsion as compared to albumen or collodion, and I have not yet heard of a single case in which it not hold out as well as, or better than albumen or collodion. While on this subject I will say, that if you doubt these statements they can easily be proven by yourself and to your entire satisfaction. Take home with you a sample package of Solio; tone it exactly as per the instructions, fix in the subsequent fixing bath, wash thoroughly and mount, then expose them to the light with a mask over one-half of the face. This test will settle all doubts in your mind as to the permanence of gelatino-chloride papers.

To successfully work a gelatine paper it requires that a printer should forget that he knows anything about the business except how to make vignettes and handle prints. He should take the instructions sent out by the manufacturer of the paper he is using, place implicit confidence in and follow them to the letter. He may have some technichal difficulty but the chances are that he will not. If the combined bath is used, the paper requires altogether different handling from albumen; in fact, to tone prints in the same way you would tone albumen, that is, put a few in at a time, when they are toned take them out, and put more in, would

be a certain method of producing prints that would be unsatisfactory and that would not last. To insure the best results with the combined bath and gelatine paper, mix the ingredients, excepting the gold and lead, several days ahead, which allows the solution to ripen. There are a number of different combined baths on the market, and in selecting the one you intend to use, the point to guard against is a bath containing acid chemicals (which gives a strong acid reaction) without giving an alkali to offset them. A combined bath should be used cold to prevent the liberation of sulphur; for this same reason you should select the bath containing the smallest amount of acid chemicals and the largest amount of alkaline. A combined bath must be used acid, as acid is an alum compound that will not stay suspended in a neutral or alkaline solution; consequently you can only add enough alkali to neutralize the excess of acid in the alum.

A good gelatine paper, or one that is coated uniformly and evenly, can be toned with either a separate or combined bath; the bath to be used depending in a measure on the tones which the customers require. The combined bath is best for a warm or medium tone, and the separate bath for a medium or dark tone.

In handling prints with the separate bath, the manipulation is practically the same as with albumen paper. It may take a little more preliminary washing, and the toning bath must be tested more carefully, so as to have it as neutral as possible. Prints should be thrown from the toning bath into a weak salt solution and allowed to lie there for a few minutes, and then, if the batch is a large one and it will take some time to tone it, they should be put in clear water. The fixing bath should contain alum with enough alkaline to neutralize the excess of acid in alum, and sulphite acting as a restrainer to prevent the prints toning down while in the fixing. The final washing should be a thorough one, the prints being kept in motion constantly so as to secure a thorough elimination of the hypo. The mounting is done in the same manner as with albumen paper.

The combined bath is a very simple one, and can be worked by anyone possessing an ordinary amount of intelligence. The only place judgment is required is in taking the prints from the

bath at the right time. The solutions are mixed by weights and measures. To tone the prints you take a given number of prints to a given amount of solution, and to be successful you must use a thermometer, keeping the temperature at about 50° Fahr. This reduces the whole process to a mathematical calculation. The operator working to a given rule knows that he will produce certain results. An important element in handling prints in the combined bath is to keep them moving constantly, as when the prints are first put in, the silver has to be fixed out. If they are allowed to mat together, the small amount of hypo solution between the prints will not be sufficient to take up the silver. As a result, there will be an excess of silver over hypo and consequent sulphurization. This can easily be overcome by putting in 14 or 15 prints at a time, handling all the prints over each time this number is added. A second important point is, that this solution should not be used a second time. All the prints that you expect to tone in it should be put in at once, one at a time of course. To tone with the combined bath, mix the solutions carefully according to formula; dissolve the hypo and alum together, then dissolve the borax in hot water and add while hot. Estimate the number of prints in the batch, and to each 15 cabinets, or their equivalent, allow 8 oz. of A and 1 oz. of B solution. Reduce the temperature to 50 degrees Fahr., and immerse prints in the toning bath one at a time, face down. When 10 or 12 prints are in, turn them face up and see that there are no air bells on the prints. Then put in a few prints, as before, turn them face up, handle over those already in the tray, and repeat in this manner until the entire batch is in the toning bath. Now draw all the prints to one end of the tray, and as rapidly as possible throw them one at a time to the other end, repeating this handling until the prints are toned. When toned, throw the prints into a salt solution, and from there to the subsequent fixing bath, which should be used to insure the thorough fixing of prints and their permanency.

The chemicals to be used with gelatine paper are the same as you have always used, except the alum; this should be crystallized or ground alum, not pulverized, fused or burned. It will

probably surprise some of you to learn that one of our best points often works to our greatest disadvantage; that is, the paper lying perfectly flat in the solutions. This makes it very easy to handle the prints, but it frequently happens that a man who has had no previous experience with the paper does not notice how flat the prints lay, and allows them to mat together in the toning, fixing or washing solutions. You will all realize that prints allowed to mat together in this way are liable to be defective. It is of great importance that the final washing should be done by hand, or with a tank that will keep them in constant motion.

More Power Required.—The Bausch & Lomb Optical Company are temporarily shut down, making an addition to their power plant. About a year ago, when they doubled the size of their plant, they put in a Harris-Corliss engine of 350 horse-power, and the growth of the business since that time has been so great as to require more than this would give. They are therefore now putting in another engine of the same make and capacity, thus making a pair of engines and giving a maximum power of 700 horse-power, thus giving a capacity which is far in excess of that used by any optical establishment in the world; in fact, equal to that of many of the large ones combined. Besides this, they have put in an Arlington & Sims high-speed engine of 150 horse-power for creating electricity for 1300 lights, and further a small engine of 15 horse-power for a 100 light dynamo, for giving light at night and for over-time work.

1894.—Do not neglect to renew your subecriptions for the coming year. If you are an "up to date" photographer, yor cannot afford to do without the AMERICAN JOURNAL OF PHOTOGRAPHY.

Dull Times only reign in such photographic galleries where the proprietor never has time to read any photographic peridocals or literature.

The Busy Photographer always has time to read at least one or two photographic periodicals. This is why his work is better than his neighbor's, who cannot afford to subscribe to any photographic journal.

OUR ILLUSTRATIONS.

Frontispiece.—"The Gilpin Gallery of the Academy of Fine Arts at Philadelphia." It is rarely that a difficult subject like this is reproduced exclusively by the photographic process without the aid of handwork, reproducing all gradations of light and shade, and at the same time giving the various color values, which here run through the whole gamut of gradations, primary, secondary, and tertiary.

Our picture is an example of the great perfection to which commercial dry plates have been brought, and of the results which are now to be obtained without resorting to the use of color filterers, screens, orthochromization, and other dodges, provided that an intelligent system of development is used.

The original negative of our picture was made upon a Stanly dry-plate, without the use of a color screen back of the lens, or staining the plates. No spotting or retouching whatever was done upon the negative, nor was burnisher or tool used upon the copper plate upon which the reproduction is etched.

The picture is well worthy of the attention of all lovers of photography on account of the various conditions of the subjects photographed. The dark group of bronze in the centre of the hall, surrounded by the brilliantly-colored pictures in heavy gilt frames which line the walls, the open doorway, the bright vista with the two marble statues in the distance, all tend to increase the difficulty in obtaining a perfect picture.

A Gleam of Sunlight.—Our extra illustration from a photograph by Mr. George Essig, the well-known artist and etcher, needs no comment. The composition, the light, and shade speak for themselves, and well illustrates the possibilities of the camera when in the hands of a trained artist. The subject, always a difficult one, is here brought out in all the beauty of nature; the negative was not retouched.

Our flash-lamp picture in the November Journal has attracted considerable attention, and we have received numerous communications in regard to the means by which it was produced. It was made by the aid of the "Hemperley Flash-Lamp," with pure magnesium powder. This apparatus gives successive flashes of brilliant light, and is the best substitute for blitz-pulver, in situations where it is not advisable to use the latter actinic illuminant. Our illustration in the November Journal is one of a number of views made in a Philadelphia residence. All are of equal excellence and well show the capabilities of the Hemperley lamp.

The Editorial Dropshutter.

Photogrammetry.—Especial attention is called to the important paper published in the current number upon "Civil and Military Photogrammetry," by Professor R. Meade Bache, assistant United States Coast and Geodetic Survey. Nearly two years ago Professor Bache presented to the University of Pennsylvania a plan for civil and military balloon photogrammetry. This system he had described at length in a paper read before the American Philosophical Society, the oldest scientific society in America. The University of Pennsylvania referred the matter to the committee on science, which not only passed favorably upon the suggestion, but certain members of the board became so greatly interested, that Dr. Pepper and others set their names down towards a fund for the purpose of bearing the expenses of the experiments in case they were carried out, since which time Professor Bache has unfortunately been too continuously engaged in field and office duty to follow up his experiments. It is expected, however, that Professor Bache in the near future will be able to institute a series of experiments under his personal supervision upon the lines as set forth.

Next month we shall publish the last instalment from the same author, upon "Balloon Photogrammetry."

Ives on Lumiere-Lippmann.—At a meeting of the Photographic Society of Philadelphia, a communication from Frederic E. Ives, who is at present in London, was read, being a critical account of the Lumière-Lippmann color photographs recently shown in London. Aside from the general interest in the subject, this paper is important because it is the first full and authentic information concerning these results which has reached this country, and because it comes from the pen of one whose own process of color photography—composite heliochromy—has won the highest awards from the London Society of Arts, the Photographic Society of Philadelphia, and the Franklin Institute. The paper is published elsewhere in full.

Lumiere's Photographs in Natural Colors.—Since the above paper was in type we received the text of Mr. Leon Warnerke's paper, read before the Photographic Congress in Great Britain. We reprint the paper elsewhere in full, together with the abstract of formulæs and the discussion which followed. This communication is of especial interest, as it is the first authentic information regarding the results obtained by Messrs. Lumiere with their modified Lippmann process, which gives any insight of the means by which they were obtained.

California Camera Club.—On Wednesday evening, November 8th, 1893, at their club talk, Mr. F. M. Day gave a demonstration on "How Newspaper Cuts Are Made." This was followed by the exhibition of a set of slides from New Orleans, Oakland, and San Diego Clubs.

In Memoriam.—The Photographic Society of Philadelphia at its October meeting adopted the following minute in regard to the death of Mr. George M. Taylor:

Minute.—In the death of George M. Taylor, which occurred on July 28th, 1893, the Photographic Society of Philadelphia lost one of its most useful members and officers, and his associates a warm and valued friend. From the day of his entrance into the Society he manifested a deep interest in its welfare, contributing from the store of his wide experience wise counsel for the extension of its work and influence. In every movement for the material advancement of the Society Mr. Taylor took an active part, and the practical help he gave in the work of reorganizing the Society's administrative system in 1890 naturally marked him for selection as one of the first Directors. As a member of the Board also he brought to the service of the Society his best abilities. Regular in his attendance at the meetings he assumed the full share of the duties and responsibilities of the position. The work which he was able to do and the influence which he exerted will long remain, and it is with deep sorrow that the Board places this minute upon the record of its proceedings.

Photo-chromotype.—Messrs. Husnik and Hausler, of Prague, Austria, send us a specimen of their latest reproduction in natural colors. The process consists of a three-color print from half-tone blocks, produced from an equal number of photo-negatives, one for yellow, one for blue, and one for red; these are transferred to zinc and etched. The specimen sent us represents a vase of fruit grapes, etc., with a bright colored parrot. At the base of the vase is a cut melon and various smaller fruits. The whole is well reproduced. Accompanying this print are three impressions in the primary colors, blue, red, and yellow, showing how the superposition of the transparent inks produces the various secondary and tertiary shades of color. In our next number we expect to produce a specimen of American ingenuity in photo-chromotype, which, judging from proofs submitted, will fully compare with any domestic or foreign efforts thus far shown.

A Salvage Judgment.—A feature of the defence in a late salvage suit before the Admiralty in London was the production of photographs taken at the time the Winchester took the Maasdam in tow, and which plainly negatived the plaintiff's claim that the weather at the time was severe, and that the Maasdam was in great danger.

Obituary.—The death is announced in Chicago of Mr. Charles Gentile, late Editor of the "*Eye.*" He was in poor health for some time, but nothing serious was feared or looked for. Mrs. C. Gentile, the widow, will continue to publish the paper.

Photographic Adversaria will not appear again till January 1894. The publisher states that the lack of interest in photography at the present time does not seem to justify the publisher in an expensive effort to make the Magazine what is desired. Upon re-appearance the *Adversaria* will be a thoroughly Illustrated Photographic Journal.

Done in Black and White.—"The World's Fair" by the members of the Photographic Society of Philadelpha.

The Successful Photographer is the professional who keeps himself posted by learning from the photographic press what is going on in the photographic world. Would you be one of the successful ones, subscribe to the AMERICAN JOURNAL OF PHOTOGRAPHY., if you have not already done so.

The Wide-awake Photographer subscribes to the AMERICAN JOURNAL OF PHOTOGRAPHY and never fails to consult the bargain lists and the advertisements.

The "American Journal of Photography" is a fresh illustration of the progress of the art, and commends itself to the class especially interested in its publication in the usual way.—*Philadelphia Evening Telegraph.*

Subscriptions for 1894.—A prompt renewal of your subscriptions helps the editor and encourages the publisher—Volume XV. begins with the next number.

Volume XIV.—This number completes the fourteenth volume of the AMERICAN JOURNAL OF PHOTOGRAPHY. Do not neglect to have the volume for the past year bound. Volume XV. will be even better. Renew your subscriptions without delay.

Photographic Scissors and Paste.

Flying Machines.—The committee on aeronautics, appointed some time since by the Massachusetts Charitable Mechanic Association, decided at a recent meeting that from the information which it has been able to collect, it does not yet seem advisable to hold an exhibition of flying machines, such as was suggested and contemplated. Since it is true that but a portion of those actively interested in the matter of air-navigation have thus far replied to the notices of the committee, it was voted to acquaint the public, through the daily press and the scientific periodicals, with the desire of the Association to collect information about methods and machines. Should this result in such increase in information as to justify the committee in so doing, it will suggest to the Association the desirability of a public exhibition with premiums, or some methods of aiding investigators who have invented meritorious devices. The committee consists of Henry D. Dupee, of Walpole, Mass., and Samuel Cabot and John Ritchie, Jr., of Boston, to any one of whom information may be sent.

Professional Experience.—They were going to have their pictures taken. There were three of them in the photographer's dressing room, and three tongues were running.

"Let's have the first proof taken with our eyes cast down—it makes such a cute picture," suggested Polly, who had long, thick black lashes, and knew how effective they were.

"Oh, no!" pouted Nellie, curling her Titian red locks and wrinkling up her pale straw-colored eyebrows in disgust. "I'm too strawberry blondish for that. Where's the powder puff? I'm going to smile in one of the sittings. S'pose I'll look like that orang-outang in the Javanese village, but I'm going to smile, because Harry Dalley says he thinks my smile is so winsome."

"Harry, indeed!" snorted Margaret, giving a vicious jab at her bangs with a few invisible hairpins. "That man just fills you up with all sorts of compliments, and you believe every word he tells you. He's a most arrant flirt. Why, he told me you had a 'smile that went clear across your face and half way down your back.' Nice expression for a gentleman (?) to use!"

"I don't care," snapped Nellie, her cheeks a trifle pinker. "He just said that for fun. He's always rather slangy, and I don't believe he's such a flirt as you would make him out. Put a pin in my belt, there's a love."

"Where on earth are my ear-rings?" queried Polly, upsetting a bottle of glycerine in her search through a hand satchel which contained the following articles: One hair brush, one powder box, one powder puff, two cold cream jars, three curling irons, a bunch of artificial flowers, two switches, several bangle bracelets, a package of assorted hair-pins, one lace bertha, two evening bodices (both somewhat the worse for wear), two pairs satin slippers, one feather fan, one box of rouge, two pencils, one paste hair-pin, one ribbon crown, two necklaces, and a sash.

"Are you nearly ready, ladies?" asked a woman from the other side of the locked door. "The photographer says he's been waiting some time."

"Well, we're almost ready. Just tell him we'll be out in five minutes," and Meg fastened a few curls in the center of her Psyche knot, pinned up a chiffon ruffle, and began a search for the shoe-horn.

"I wish my nose wasn't so long," said Polly, powdering the end of that appendage till it looked like Humpty Dumpty's proboscis might have done.

"Just thank your stars your cheek bones aren't as high as a Navajo squaw's, as mine are," said Meg, gloomily, training a tiny curl straight down in the middle of her forehead like the bad little girl in the verse.

"Are you almost ready, ladies?" asked the same woman, in a resigned sort of tone, some fifteen minutes later.

"Yes, we'll be there right away," and a moment's silence was followed by: "How do I look, Meg?" "Is my dress on straight, Polly?" "Dear me, what does make that photographer so impatient?" "How is my hair? I declare it's nearly impossible to make it stay in curl!" "My slippers are miles too big, and they make my feet look large." "Where's my powder rag?" "I like evening dresses cut square in the neck." "Just pull my sash a little tighter, Polly." "Are you going to wear gloves?" "That ribbon crown is so becoming to you." "Yes, Harry always likes ornaments in the hair."

Three weeks later they receive the proofs of their pictures, and after a careful examination of the same each girl comes to the conclusion that "they don't half do her justice, but they just flatter the other girls to death."—*Chicago News.*

Apelles owed his brilliant coloring to a liquid of unknown composition with which he covered his pictures.

Photographic Hints and Formulæ.

Removing Yellow, Green, Red, or Dichroic Fog.—Dr. Meniére, of Paris, advises the following treatment: Soak the negative in ordinary water for five minutes, and then immerse in

Water	100 parts.
Bromide of sodium	3 parts.
Bromine water	3 parts.

Leave in for ten or fifteen minutes. The bleached image is well washed and dried, and the image redeveloped with an amidol-sulphite developer.—*The British Journal of Photography.*

The Blue Process.—The following process for producing cyanotypes on paper is recommended by Herr F. Veress, the well-known photographer of Hungary, in the *Photo-Almanach f.* 1893. Two solutions should be prepared:

SOLUTION A.

Iron and ammonia citrate	8 grammes.
Ammonium ferrocyanide	2 grammes.
Oxalic acid	1 gramme.
Distilled water	120 c.c.

SOLUTION B.

Ferricyanide of potassium	8 grammes.
Ammonium ferricyanide	2 grammes.
Distilled water	120 c.c.

The two solutions are mixed and then filtered. Previously moistened glossy baryta paper is floated on the filtered solution for about four minutes, when it is dried at 89° F. The paper is then printed in the usual manner beneath a negative. The prints are washed in soft water, and then placed one by one in a mixture of 100 parts water and one part of hydrochloric acid. They are allowed to remain in it about five minhtes, until the image has become quite pure. Finally the prints are well washed in clean water.

To produce blue prints on canvas and silk the following process is given by the same author: 5 grammes of arrowroot are dissolved in 50 c.c. of water; 2 grammes of gelatine are dissolved in 50 c.c. of warm water; 300 c.c. of water, to which has been added 1 gramme of ordinary white sugar, 10 drops of glycerine, and 5 drops of a saturated solution of caustic potash, are boiled, and the arrowroot and gelatine solution added to it by constant stirring. The liquid is then filtered

through flannel in a flat dish resting in a warm water bath. The fabric to be sensitized is placed on the liquid and allowed to float for from four to five minutes; it is then mounted on blotting paper, which is fastened to a drawing-board and dried in a warm room. The fabric is sensitized and printed as described above, and it should be used soon, for it quickly loses its sensitiveness. Before fixing, the prints should be placed one by one between sheets of blotting paper, in order to avoid spots. Fixing is done as above described, in water acidulated with hydrochloric acid.

A Dead Black.—An excellent blacking for wood or leather is made by mixing lamp black with *only* as much French Polish as is needed to make it adhere sufficiently after being applied with a flat camel hair brush and allowed to dry. Too much polish will make the surface shiny, and too little will not secure the the black pigment. The mixture may be made in a saucer and stirred with a brush, and thinned with a little methylated spirit, if necessary. It is well to try it first upon a piece of waste wood or card, and not to use it until the constituents have been so adjusted by trial. But it must be used quite freshly mixed. Bought blacking is apt to be spoiled by keeping.

How to Print on Marble.—Mr. Villon publishes the following process: Coat an unpolished plate of marble with the following solution: Benzine 500 parts, spirits of turpentine 500 parts, asphaltum 50 parts, pure wax 5 parts. When dry expose under a negative, which will take in sunsnine about twenty minutes. Develop with spirits of turpentine or benzine, and wash in plenty of water. Now cover the plate where it is intended to be left white with an alcoholic solution of shellac, and immerse the same in any dye which is soluble in water. After a while, when enough of the coloring matter has entered the pores of the stone, it is taken out and polished. The effect is said to be very pretty.—*Photographisches Archiv.*

Hypo.—The Harvard University Observatory are using the Walpole Hyposulphite of Soda for the development of their astronomical photographic plates, in preference to all other hyposulphites they have tried.

Modiste—"Haf you look ofer zee new fashion plates I send you?"

Lady—"Yes, very carefully."

"And vat do you decide!"

"I have made a composite photograph of them all, and I wish you to make my dress look as much unlike it as possible."—*N. Y. Weekly.*

RECENT PATENTS.

THE following list of patents relating to the photographic interests is especially reported by Franklin H. Hough, solicitor for American and Foreign Patents, No. 925 F. St., Washington, D. C.

508,204—Photographic plate-holder, E. R. Bullard, Wheeling, W. Va.

509,611—Magazine camera, L. and A. Chronik, Brooklyn, N. Y.

509,721—Photographic retoucher, J. R. Drake, Medford, Wis.

To the November number of the *Review of Reviews*, President E. Benjamin Andrews, of Brown University, contributes an article on the "Future of Silver Production." President Andrews traces the present abundance of silver largely to the rapid extension of railways within the last few years, and believes that, in the future, lack of new transportation facilities, scarcity of necessary lumber in the neighborhood of mines, the improbability of new silver-bearing regions being discovered, the increased cost of smelting, and other causes, will check very materially the production of the "white metal," not only in the United States, but also in Mexico and South America.

A New Departure.—The Photographic Society of Philadelphia lately took action looking to the holding of a "Visitor's Night," at which ladies are to be welcome, and at which the "Interchange Slides" will be shown. On "Members' Night," on the fourth Wednesdays, the lantern will be lighted especially for the purpose of testing slides for the members.

The first "Visitors' Night" under this new order was fixed for November 1st, at which slides from Buffalo and the home set of last year were shown, with some English slides also.

Remove egg stains from spoons by rubbing with salt.

A small box filled with lime will absorb dampness.

Cream and acids do not curdle, milk and acids will.

Gum camphor scattered about mice haunts will drive them away

Society Notes.

In Black and White.—An illustrated lecture was given November 20th, 1893 at Association Hall, by the Photographic Society of Philadelphia. The subject was "The World's Fair" done in black and white, by members of the Society. The lecturer of the evening was Mr. W. N. Jennings. The selected slides were the work of Messrs. Joseph H. Burroughs, John Cartbutt, Samuel Castner, Jr., J. L. Dillon, R. I Hazzard, W. N. Jennings, F. S. Lewis, I. H. Milligan, A B. Parvin, W. H. Rau, W. H. Roberts, A. W. Robinson, W. D. Robinson, Jos. C. Roop, Edmund Stirling, Geo. Vaux, Jr., Jos. M. Wilson and others.

The exhibition was the outcome of the fact that the photographs made by the official photographer of the World's Fair fell far short of doing justice to the art, and give a poor idea of the splendor of the Columbian Exposition, therefore the members of the Photographic Society of Philadelphia, undertook some months ago the task of making a series of negatives which should embrace, as far as practicable, the most interesting features of the Fair.

This effort resulted in a superb collection of Photographs of the highest technical and artistic excellence.

In addition to the architectural feature of the Fair, a large number of "snap-shots" on the Midway Plaisance were introduced which added no little to enjoyment of the lecture.

Some embarrassment was occasioned by the premature exhaustion of gas in the lime light cylinders, which threatened to bring the entertainment to an untimely close, but Mr. Jennings explained that a leak had caused the trouble and prevailed upon the audience to remain seated until a new supply was obtained, which was done immediately, causing an intermission of about fifteen minutes.

California Camera Club.—The forty-second illustrated lecture of the club was given on Friday evening, November 17th, 1893, at the Metropolitan Temple. The subject was "The Customs of Ancient Rome." The lecture and slide were by Mr. Charles H. Stule.

BARGAIN LIST.—DEC., 1893.

Lenses:

1—5x8 Wide-angle Lens,	$9 00
1—10x12 Blair Orthographic Lens	20 00
1—½-size Francais Portrait Lens	15 00
1—Extra 4x4 Darlot Lens	20 00
1—Set 1-9 Gem Lenses	18 00
1—10x12 Dallmeyer Group Lens	40 00
1—4x5 Dallmeyer R R Lens	22 00
1—4x5 Darlot Wide Angle Lens	10 00
1—R R Detective Camera Lens	3 00
1—Matched pair Gundlach Stereo Lenses	13 00
4—½-tubes in plate	12 00
1—½ Voigtlander Lens	9 00
1—4-4 Harrison Portrait Lens	18 00
1—6½x8½ E. A. Single Lens	5 00
1—4x5 Rectilinear Lens	4 50
1—4-4 Harrison Portrait Lens, no stops	16 00
1—4-4 Jamin Globe Lens	12 00
1—¼ size Holmes, Booth & Hayden Lens	4 00
1—¼ size Harrison Lens	4 00
1—¼ size Gem Lens	1 50
1—5x8 R. O. Co's. Single Lens	2 50
1—2 B Dallmeyer Lens	50 00
1—¼-size Voigtlander Lens	6 00
1—5x8 W. A. Lens	5 00

HAND CAMERAS.

1—4x5 Folding Premier Camera, R. R. Lens,	22 00
1—No. 1 Kodak,	10 00
1—A Ordinary Kodak, new,	5 00
1—A Daylight " "	7 25
1—C Ordinary " "	13 50
1—5x7 Folding Kodak "	55 00
1—3¼x4¼ New Model Improved Camera, new,	11 00
1—Leather Covered Hawk Eye, with 2 Holders	10 00
1—4x5 Climax Detective Camera, leather-covered, new	20 00
1—4x5 Turnover Camera, new,	15 00
1—4x5 Montauk Detective Camera, new	20 00

VIEW CAMERAS.

1—5x7 Waterbury Camera, lens and tripod,	7 00
1—8x10 Double Swing View Camera, reversible back,	25 00
1—5x8 Blair R. B. Camera, 6 holders, 8x10 Attachment, 5 holders, and Euryscope lens,	45 00
1—6½x8½ Novelette Camera, new	20 00
1—5x8 Blair Single Swing View Camera	$15 00
1—6½ x 8½ American Optical Co.'s first quality View Camera, new	20 00
1—5x8 Wet Plate Stereo. Camera, 3 holders, case and tripod	20 00
1—5x8 Tourist Outfit, 2 Daisy Holders, tripod and case	25 00
1—5x7 Blair Rev. Back Camera, new	25 00
1—5x8 Boston Rev. Back Camera, new	25 00
1—5x7 Favorite Camera, 6 holders and tripod	12 00
1—Eclipse Outfit, 3¼x4¼,	2 00

PORTRAIT CAMERAS.

1—8x10 Portrait Camera, double swing	15 00
1—10x12 Climax Portrait Camera, double swing, with Benster holder, good as new	35 00
1—8x10 Double Swing Portrait Camera with Benster Holder, new	27 00
1—5x7 Victoria Ferrotype Camera	9 00

Accessories:

PROFESSIONAL.

Lot of Picture Mats. Write for particulars.	
1—15-in. Globe Enameler, good condition,	26 00
1—20-in. Double Roll Entrekin Burnisher,	20 00
1—Acme Print Trimmer, new,	10 80
1—Baldwin Print Cutter.	14 00
1—11-in. Acme Burnisher,	12 00
7—6½x8½ Book Holders for New Model Camera, each	1 20
8—5x7 ditto, each	1 00
1—14x17 Printing Frame	1 00
1—Air Brush	30 00
1—10 in. Quadruplex Enameler,	15 00
2—10 in. Entrekin Eureka Burnishers, each	10 00
1—10 in. Entrekin Accurate Burnisher,	12 00
1—14 in. Entrekin Eureka Burnisher	18 00
1—15 in. Entrekin Duplex Rotary Burnisher	15 00
1—6x8 Children's Background	3 00
1—6x8 Children's "	4 00
1—8x10 Bryant "	7 00
1—8x10 Bryant "	6 00
1—Wall Accessory	4 00

POSITION wanted by a photographer, 15 years experience in all branches of photography and in running galleries of high standing. Good reference. In reply please state wages.
STEPHEN E. LARSON,
Phillipsburg, Centre County, Pa.

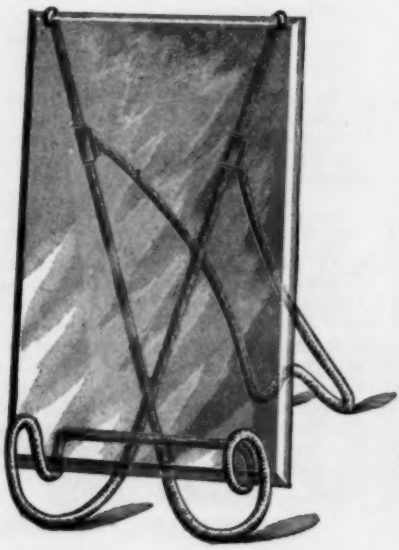
WANTED.—Situation as crayon and pastel artist. Address CHAS. HAES, 126 S. Twelfth St., Reading, Pa.

A GRAND OPPORTUNITY. — New building, the best in town. No opposition. In the live town of Elkton. Rooms fitted for the purpose. Don't wait to write, but come and see for yourself. J. J. PAYNE, Elkton, Md.

EXPERIENCED Retoucher wants a position to retouch and learn printing and operating. Address M. BILLINGER, Stormy Creek Mills, Berks County. Reading, Pa.

A Photographic Manufacturing Company is being established with factories near New York City, having unsurpassed facilities for the manufacture of Photographic Goods. They are about to place upon the market the New Harvard Plate, unexcelled in sensitiveness and reliability for Portraits, Landscapes, and General Work.

Easels, Photo. Holders and Hangers.



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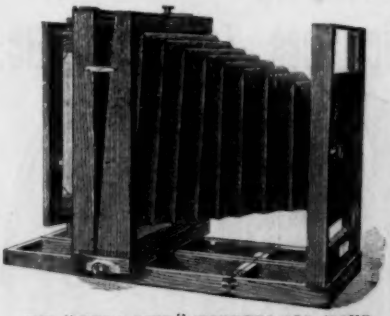

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Yours truly,

F. J. RYDER.

"Fills the Bill."

CLEVELAND, OHIO, Oct. 5th, 1893.

EASTMAN KODAK CO.
Rochester, N. Y.

* * * * * * *

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Yours truly.

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Best for Commercial Work.

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* * * * * *

I have only had occasion, so far, to use your Solio paper on commercial work, and must say that for that purpose it cannot be surpassed, **if equaled.**

I am yours very truly,

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"Saves a Lot of Time."

PLATTSBURGH, N. Y., Sept. 29th, 1893.

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Gents:

* * * * * *

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No Fault to Find.

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* * * * * *

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* * * * * *

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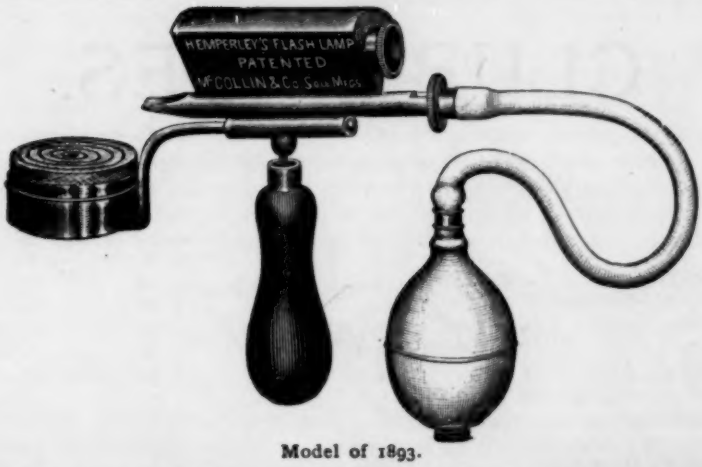

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Vol. XIV. OCTOBER, 1893. No. 166.

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